1H-NMR spectroscopy lipoprotein profile in patients with chronic heart failure versus matched controls

Authors:
A Teis¹, G Cediel¹, N Amigo², J Julve³, J Ribalta⁴, E Castelblanco³, J Franch⁵, P Codina¹, J Lupon¹, D Mauricio³, N Alonso⁶, A Bayes-Genis¹, ¹Germans Trias i Pujol University Hospital, Heart Institute. Cardiology Department - Barcelona - Spain. ²University Rovira i Virgili, Biosfer Teslab, SL - Tarragona - Spain. ³Hospital de la Santa Creu i Sant Pau, Institut de Recerca - Barcelona - Spain. ⁴University Rovira i Virgili, Unitat de Recerca en Lipids i Aterosclerosi - Tarragona - Spain. ⁵Fundació Institut Universitari Recerca a Atenció Primària de Salut Jordi i Gurina (IDIAPJGol), DAP-Cat Group. Unitat de Suport a la Recerca - Barcelona - Spain. ⁶University Hospital Trias i Pujol, Endocrinology Department. Heart Failure Unit. - Barcelona - Spain.

Topic(s):
Biomarkers

Background. Advanced lipoprotein phenotyping is a better predictor of atherosclerotic cardiovascular risk than cholesterol concentration alone. Lipoprotein profiling in heart failure (HF) is incompletely characterized. We aimed to describe the lipoprotein profile in patients with chronic HF compared with a matched control population.

Methods. This cross-sectional study was performed from May 2006 to April 2014 and included ambulatory patients with chronic HF. Lipid concentrations and size of the main lipoprotein fractions (HDL, LDL and VLDL) and particle concentration of their three subfractions (large, medium and small) were assessed using 1H magnetic resonance spectroscopy.

Results. The 429 included patients with chronic HF were compared with 428 matched controls. Patients with chronic HF presented with lower total cholesterol and lower mean LDL (1115 vs. 1352 nmol/L, p < 0.001) and HDL (25.7 vs. 27.9 mmol/L, p < 0.001). Mediating this difference were significantly lower small subfractions of LDL (635.4 vs. 792.2 nmol/L, p < 0.001) and HDL (15.2 vs. 18.6 mmol/L, p < 0.001). Mean VLDL, LDL, and HDL particle size was significantly higher in patients with HF vs. controls. All HDL-related differences from controls persisted after adjustment for New York Heart Association functional class or body mass index. We found strong negative correlations of known cardiac biomarkers (N-terminal pro-brain natriuretic peptide and ST2) with total and small LDL and HDL fractions and HDL particle size.

Conclusions. Patients with chronic HF significantly differ in their lipoprotein profile compared with unaffected controls. Further research is needed to better understand the pathogenic relevance of this difference.